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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,445	11/14/2003	David Alan Burton	END9-2002-0061US1	9621
45216	7590	08/10/2006	EXAMINER	
KUNZLER & ASSOCIATES 8 EAST BROADWAY SUITE 600 SALT LAKE CITY, UT 84111			WALTER, CRAIG E	
		ART UNIT	PAPER NUMBER	2188

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/713,445	BURTON ET AL.	
	Examiner	Art Unit	
	Craig E. Walter	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 12 June 2006.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-26 and 28 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-26 and 28 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 14 November 2003 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ . | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Status of Claims

1. Claims 1-26, and 28 are pending in the Application.

Claims 1, 3-5, 7, and 10-26 have been amended.

Claim 27 has been canceled.

Claims 1-26, and 28 are rejected.

Response to Amendment

2. Applicant's amendments and arguments filed on 12 June 2006 in response to the office action mailed on 10 March 2006 have been fully considered, but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-13, 15-26, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Dunham (US Patent 6,269,431 B1).

As for claim 1, Dunham teaches an apparatus for managing incremental storage, the apparatus comprising:

a policy management module (host - Fig. 1, element 20) configured to set a storage management policy for storage capacity of a storage pool (secondary storage - Fig. 1, element 29), wherein the storage pool is configured to store incremental storage data from an incremental storage operation on a primary volume and the storage pool comprises at least one storage volume allocated as a virtual volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume).

a storage pool management module (backup agent - Fig. 1, element 25) configured to monitor available storage capacity of the storage pool and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare primary storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein changing the storage capacity comprise allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63). Note additionally Dunham teaches de-allocating volumes in the primary storage after modification access – col. 6, line 33 through col. 7, line 17; and an incremental log (primary directory - Fig. 1, element 26) corresponding to the virtual volume, the incremental log configured to map a virtual address assigned to the incremental storage data to a physical storage address of the at least one storage volume of the storage pool (col. 6, lines 33-40 – the directory contains a list of pointers

(i.e. addresses) which point to the physical location of data contained within the primary storage volumes).

As for claims 12 and 24, Dunham teaches a method (and medium comprising code configured) for managing incremental storage, the method (and code) comprising (configured to):

monitoring available storage capacity of the storage pool and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare primary storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein the storage pool is configured to store incremental storage data from an incremental storage operation on a primary volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume).

allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63.

Note additionally Dunham teaches de-allocating volumes in the primary storage after modification access – col. 6, line 33 through col. 7, line 17), wherein the storage pool comprises at least one storage volume allocated as a virtual volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume); and

mapping an incremental log (primary directory - Fig. 1, element 26) corresponding to the virtual volume a virtual address, assigned to the incremental storage data to a physical storage address of the at least one storage volume of the storage pool (col. 6, lines 7-40 – the directory is used to map the physical locations of the data to the virtual address of the data stored in the volumes of the secondary storage device (the host accesses the backup data on the secondary storage device via virtual addressing – col. 1, line 60 through col. 2, line 18)).

As for claim 16, Dunham teaches a system for managing incremental storage, the system comprising:

a primary volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume);
a baseline volume configured to store a baseline backup copy of data on the primary volume (Fig. 1, element 29 – secondary storage);
a storage pool (secondary storage - Fig. 1, element 29) configured to store incremental storage data from an incremental storage operation on the primary volume in response to changes in data stored on the primary volume after storing the baseline backup copy on the baseline volume, where the storage pool comprises at least one storage volume allocated as a virtual volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume). Referring to Fig. 15, the host instructs the backup agent to allocate storage area volumes during required for the backup operation;

a policy management module (host - Fig. 1, element 20) configured to set a storage management policy for storage capacity of a storage pool (secondary storage - Fig. 1, element 29);

a storage pool management module (backup agent - Fig. 1, element 25) configured to monitor available storage capacity of the storage pool and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare primary storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein changing the storage capacity comprise allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63). Note additionally Dunham teaches de-allocating volumes in the primary storage after modification access – col. 6, line 33 through col. 7, line 17; and

an incremental log (primary directory - Fig. 1, element 26) corresponding to the virtual volume, the incremental log configured to map a virtual address assigned to the incremental storage data to a physical storage address of the at least one storage volume of the storage pool (col. 6, lines 33-40 – the directory contains a list of pointers (i.e. addresses) which point to the physical location of data contained within the primary storage volumes).

As for claim 23, Dunham teaches an apparatus for managing incremental storage, the apparatus comprising:

means for monitoring available storage capacity of the storage pool and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare primary storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein the storage pool is configured to store incremental storage data from an incremental storage operation on a primary volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume).

means for allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes in the primary storage after modification access – col. 6, line 33 through col. 7, line 17), wherein the storage pool comprises at least one storage volume allocated as a virtual volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume); and

means for mapping an incremental log (primary directory - Fig. 1, element 26) corresponding to the virtual volume a virtual address, assigned to the incremental storage data to a physical storage address of the at least one storage volume of the storage pool (col. 6, lines 7-40 – the directory is used to map the physical locations of the data to the virtual address of the data stored in

the volumes of the secondary storage device (the host accesses the backup data on the secondary storage device via virtual addressing – col. 1, line 60 through col. 2, line 18)).

As for claim 28, Dunham teaches a method for deploying a computer readable medium for managing incremental storage, the method comprising:

determining customer requirements for incremental storage (Fig. 1, element 23 – the user (i.e. customer) inputs the backup requirements via the host, element 20). This input helps the system to determine the specifics of backup required by said user;

deploying a storage management program for managing incremental storage, the storage management program comprising (the backup agent's operations are deployed via the backup software (Fig. 1, element 224))

monitoring available storage capacity of the storage pool and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare primary storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein the storage pool is configured to store incremental storage data from an incremental storage operation on a primary volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume).

allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity (Fig. 15, if a spare volume

is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes in the primary storage after modification access – col. 6, line 33 through col. 7, line 17), wherein the storage pool comprises at least one storage volume allocated as a virtual volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume); and

mapping an incremental log (primary directory - Fig. 1, element 26) corresponding to the virtual volume a virtual address, assigned to the incremental storage data to a physical storage address of the at least one storage volume of the storage pool (col. 6, lines 7-40 – the directory is used to map the physical locations of the data to the virtual address of the data stored in the volumes of the secondary storage device (the host accesses the backup data on the secondary storage device via virtual addressing – col. 1, line 60 through col. 2, line 18)) and;

maintaining the storage management program (col. 15, lines 32-54 – the backup program can be reprogrammed and loaded via a floppy disk).

As for claim 2, Dunham teaches the physical storage address as comprising a volume identifier (col. 6, lines 33-63, the pointer points to each physical unit (i.e. the directory intrinsically stores information to identify the address of the data stored in the memory, with the corresponding physical volume)).

As for claim 3, Dunham teaches the storage pool management module as being further configured to allocated and de-allocate a portion of a storage volume to the

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storage pool (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes in the primary storage after modification access – col. 6, line 33 through col. 7, line 17), wherein the storage pool comprises at least one storage volume allocated as a virtual volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume).

As for claims 4, 15 and 26, Dunham teaches the apparatus (method and medium) as further comprising a read module configured to read data stored in the storage pool by way of a data path independent from a data path used to store the incremental storage data (Fig. 2, each host (31, 32, 33) can read data from each storage system via a plurality of paths (i.e. through the ring network (30)). More specifically, each host can communicate either with the secondary storage device either directly, or indirectly via either of the two primary data storage subsystems)

As for claim 5, Dunham teaches the storage management module as allocating and de-allocating storage volumes without user input (once the backup policy is set, the host communicates with the backup agent irrespective of the user input in order to effectively manage and backup the volumes (Fig. 15)).

As for claim 6, Dunham teaches the storage pool management module as being further configured to allocate a second storage volume to the virtual volume in response to a reduction in available space on a first storage volume (Fig. 15, more volumes will be allocated to create sufficient memory to store the copied data),

As for claims 7 and 8, Dunham teaches the storage pool as comprising a RAID storage array (col. 9, lines 34-53).

As for claim 9, Dunham teaches the incremental log as comprising a lookup table (the directory is used by the system to look up the correspondence between physical and virtual addresses – col. 6, lines 33-63).

As for claim 10, Dunham teaches the storage pool management module as further configured to increase the storage capacity in response to the available storage capacity increasing above a first storage capacity threshold and to decrease the storage capacity in response to the available storage capacity decreasing below a second storage capacity threshold (Fig. 15, the allocation and de-allocation is dynamically determined based on available storage capacity).

As for claim 11, Dunham teaches the storage pool management module as being further configured to de-allocate storage volumes wherein the de-allocated storage volumes are available for allocation to a virtual volume unrelated to the storage pool (referring to Fig. 2, the plurality of primary data storage subsystems allows for the de-allocation of memory within one of the primary subsystems. The de-allocated data may at a later time be reallocated, just not to a storage area within the other subsystems storage pools).

As for claims 13 and 25, Dunham teaches providing incremental snapshot data of the primary volume in response to a replication operation (col. 5, lines 57 through col. 6, line 6 – the snapshot operation is performed in response to the backup operation).

As for claim 17, Dunham teaches a replication module configured to transmit the incremental data from the primary volume to the storage pool (Fig. 3, element 56 – the remote link adapter is used to transmit data from the primary storage subsystem to the secondary (i.e., storage pool)).

As for claim 18, Dunham teaches the incremental data comprising incremental snapshot data of the primary volume (col. 5, lines 57 through col. 6, line 6 – the snapshot operation is performed in response to the backup operation).

As for claim 19, Dunham teaches:

the primary volume comprising a plurality of primary volumes (Fig. 3, elements 59-62);

the storage pool comprising a storage pool corresponding to each primary volume (the secondary storage area stores backup data of the primary volume in order to maintain a copy of the data that corresponds to the data stored in the primary volumes);

the incremental log comprising an incremental log corresponding to each storage pool (as discussed in claim, Fig. 1, element 26); and

the storage pool management module monitors available capacity of each storage pool and allocates and de-allocates storage volumes for each storage pool (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare primary storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein the storage pool is configured to store incremental storage data from an incremental

storage operation on a primary volume (col. 19, lines 36-47 – the storage pool comprises at least one primary and virtual volume).

As for claim 20, Dunham teaches the storage module as being further configured to allocated and de-allocate a portion of a storage volume to the storage pool (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes in the primary storage after modification access – col. 6, line 33 through col. 7, line 17).

As for claim 21, Dunham teaches the baseline volume as being part of the storage pool (the baseline volume is contained within the secondary volume (Fig. 1, element 29)).

As for claim 22, Dunham teaches the policy management module as residing in a host (as per the rejection of claim 1, *supra*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dunham (US Patent 6,269,431 B1) as applied to claim 12 above, and in further view of Anaso et al. (US PG Publication 2003/0191909 A1), hereinafter Anaso.

As for claim 14, though Dunham teaches all of the limitations of claim 12, he fails to teach changing a storage capacity of the storage pool as further comprising alerting a user of a storage over-utilization or under-utilization ad changing the storage capacity in response to user input.

Anaso however teaches a storage utilization monitoring system in which the system maintains a storage capacity table, which is used to notify the user in case of over or under-utilization of storage capacity (paragraph 0047, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Dunham to further include Anaso's storage utilization monitoring system into his own system of virtual storage devices for recovery of backup data. By doing so, Dunham would benefit by having a means more efficiently monitoring storage capacity by eliminating the need for a computer itself to perform the monitoring process. This in turn would help Dunham's system to realize could help reduce system management costs incurred by system monitoring, as taught by Anaso (paragraph 0014, all lines).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
6. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig E. Walter whose telephone number is (571) 272-8154. The examiner can normally be reached on 8:30a - 5:00p M-F.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (571) 272-4210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CEW

Craig E Walter
Examiner
Art Unit 2188



Mano Padmanabhan
8/6/06

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